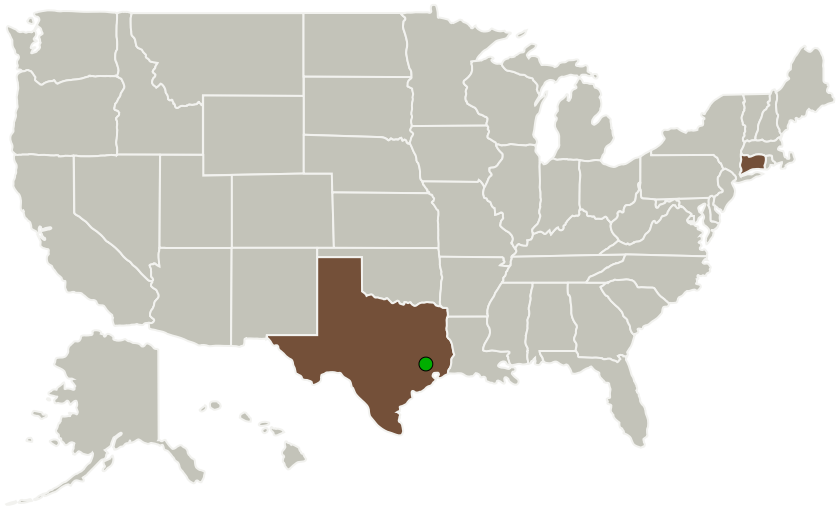
Energy Saving High-Capacity Moderate Pressure Carbon Dioxide Storage System, Phase I

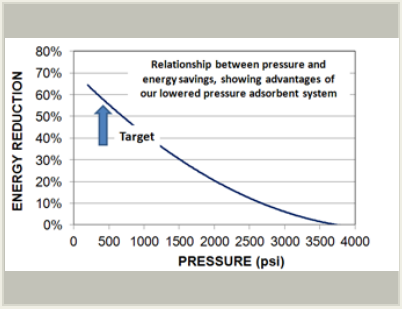
Completed Technology Project (2014 - 2014)

Project Introduction

Our approach to high-pressure carbon dioxide storage will directly address the challenges associated with storage of compressed carbon dioxide - the need to reduce power consumption, mass and volume while limiting acoustic impact. Successful implementation will reduce gas compressor power by over 50 % and required maximum tank pressure by over 80 % while maintaining storage tank footprint and total standard volume of gas. This is accomplished through the use of our high gas capacity physisorptive support architecture employing tailored zeolite sorbents. Added benefits include facile regenerability, equal applicability to other gases including oxygen and nitrogen, improved thermal management to control heats of desorption and adiabatic cooling during filling and empyting cycles. In addition to the energy savings, we expect that more compact, efficient, and less intrusive compression devices can be utilized. This approach is based on a novel regenerable high capacity physisorptive media storage system that will adsorb CO2 from a compressor system and store it at a relatively lowered pressure. On demand, the CO2 can be desorbed at a constant rate and released. For example, we can store an equivalent volumetric amount of CO2 at about 500 psi, compared to the current 3600 psi. There is a potential for substantial weight savings as well – while we add the mass of sorbent and support, mass reductions from use of thinner wall tanks and smaller compressors are likely to be larger, specific savings will be addressed as part of the proposed task plan. At the end of Phase I we will have demonstrated our approach in our in-house bench scale equipment, bringing the technology to TRL 3 with detailed performance information needed to go to TRL 4 in Phase II, including the delivery of suitable equipment to a NASA facility.

Primary U.S. Work Locations and Key Partners





Energy Saving High-Capacity Moderate Pressure Carbon Dioxide Storage System Project Image

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Organizations Performing Work	Role	Type	Location
Precision Combustion, Inc.	Lead Organization	Industry	North Haven, Connecticut
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Connecticut	Texas

Project Transitions

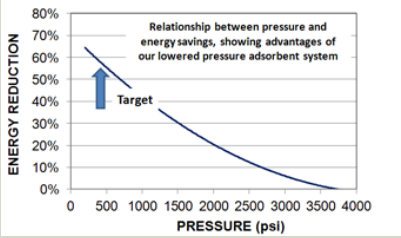
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137581)*

Images



Project Image
Energy Saving High-Capacity Moderate Pressure Carbon Dioxide Storage System Project Image *(https://techport.nasa.gov/image/131521)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Precision Combustion, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

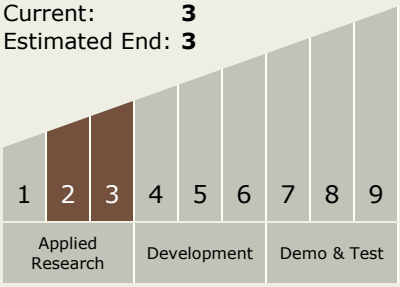
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Jeffrey Weissman

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.1 Atmosphere Revitalization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System